

# GLASS ENCAPSULATED SMD VARISTOR

## MLV - VJ12, 20, 13, 14, 15, 32 Series



### Transient Voltage Suppression, ESD protection Devices & EMI Devices



AVX's Professional Multilayer Varistors include 3 series of glass coated products as listed below:

- Standard and Industrial M0 & MC/PC Series
- Telecom MT Series
- Automotive MA/PA/QA Series

The glass encapsulation process ensures high insulation resistance values for reflow soldering and excellent SMT compatibility. This protection ensures reliability and acid-resistance against harsh environment like chlorite flux.

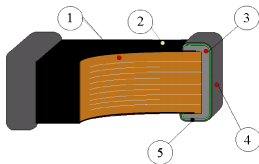
### TYPICAL APPLICATIONS

Mainly use to reduce transient over-voltages in a very wide range of electronic products. Some example applications are: 1) Telecom, 2) Automotive, 3) Consumer Electronics and 4) Industrial Applications

### PHYSICAL CHARACTERISTICS

Construction

Weight: < 0.5g



- 1 Zinc varistor ceramic
- 2 Glass lead free encapsulation
- 3 Silver termination
- 4 Nickel Barrier
- 5 Tin 100%

Dimensions mm (inches)

<p>Glass Sealed</p>	Type	IEC Size	L (mm)	W (mm)	T (mm)	Land Length t (mm)
	VJ12	0805	2.01±0.20 (0.079±0.008)	1.25±0.15 (0.049±0.006)	1.3 max. (0.052 max.)	0.15...0.55 (0.006...0.022)
	VJ20	1206	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	1.7 max. (0.067 max.)	0.25...0.75 (0.010...0.030)
	VJ13	1210	3.20±0.30 (0.126±0.012)	2.50±0.25 (0.098±0.010)	1.7 max. (0.067 max.)	0.25...0.75 (0.010...0.030)
	VJ14	1812	4.50±0.30 (0.177±0.012)	3.20±0.30 (0.126±0.012)	2.0 max. (0.079 max.)	0.25...1.00 (0.010...0.039)
	VJ15	2220	5.70±0.40 (0.224±0.016)	5.00±0.40 (0.197±0.016)	2.0 max. (0.080 max.)	0.25...1.00 (0.010...0.039)
	VJ32	3220	8.20±0.40 (0.323±0.016)	5.00±0.40 (0.197±0.016)	2.50 max. (0.098 max.)	0.35...1.30 (0.0138...0.0512)

### PART NUMBERING

<b>VJ</b>	<b>14</b>	<b>MT</b>	<b>0950</b>	<b>K</b>	<b>BA</b>
↓	↓	↓	↓	↓	↓
Varistor Termination	Chip Size	Series Code	Operating Voltage	1mA Voltage Tolerance	Packaging
VJ = plated Ni/Sn VU= plated Ni/Sn-Pb VC= hybrid solderable	12=0805 20=1206 13=1210 14=1812 15=2220 32=3220	M0/MC/PC = Standard & Industrial MT = Telecom MA/PA/QA = Automotive	AC or DC	K=±10%	BA = Tape & Reel VJ12=4000pcs/reel VJ20=3000pcs/reel VJ13=2000pcs/reel VJ14=1250pcs/reel VJ15=1250pcs/reel Except VJ15QA=1000p/r VJ32=1000pcs/reel -- = bulk

# Glass Encapsulated SMD Varistor MLV (VJ12, 20, 13, 14, 15, 32) Automotive MLV Range MA-PA-QA Series



## FEATURES

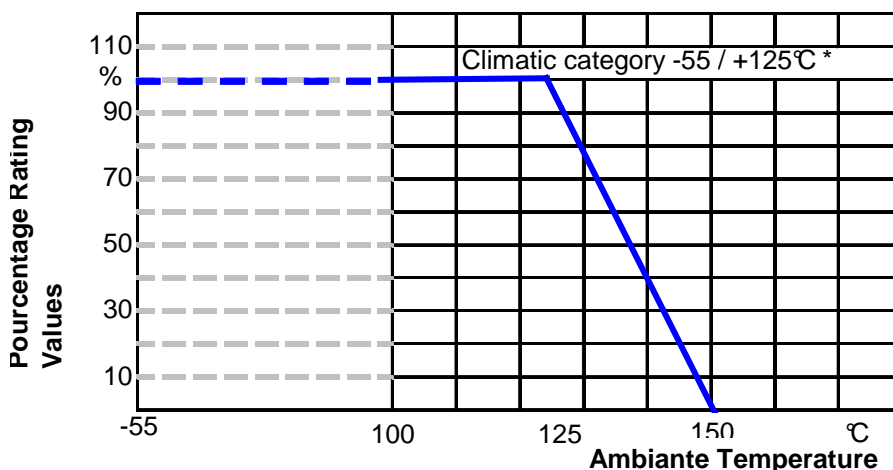
- From 0805 to 3220 Case Size
- Voltage Ratings from 16 Vdc to 42 Vdc
- Response time < 1ns
- VJ with Nickel Barrier termination suitable for lead-free soldering
- VC with hybrid solderable termination without glass coating
- Operating temperature from -55°C to +125°C (150°C on request)
- Load Dump capability from 1J to 50J according to ISO standard DP7637 pulse 5
- Storage temperature from -55 to +150°C (MSL=1)
- Complying to requirements of AEC-Q200
- Well suited for Automotive and reliable to sustain battery voltage
- RoHS Compliant, IMDS Registration upon request

## APPLICATIONS

- Over-voltage protection and transient suppression
- Airbag, GPS
- DC motor including water pump
- Seatbelt pretensioner system
- Rain sensor and Light sensor
- Car Audio Entertainment
- Hybrid vehicle applications such as regenerative braking, electric drive
- Engine start/stop transition circuitry

## TEMPERATURE DERATING CHARACTERISTICS

For current, Energy and Power



\* Except for VJ32MO & VC32MO Series

# Glass Encapsulated SMD Varistor MLV (VJ12, 20, 13, 14, 15, 32) Automotive MLV Range MA-PA-QA Series



## PART NUMBERS

	Case Size EIA	Operating Voltage		Breakdown Voltage at 1mA			Vclamp (8x20µs)		Max. Peak current (8x20µs) Amp.	Max. leakage current at Vdc µA	Energy (10x1000µs) J	Energy Load-Dump (x10 <sup>**</sup> ) J	Jump Start (5mn) max. V	Mean Power Dissipation W	Typical Cap 1KHz/.5Vrms pF	T max. thickness mm
		VRMS	Vdc	min	Nom	max	Vp	Ip(A)								
<b>12-16 V Power Supply</b>																
*VJ12PA0160K--	0805	14	16	22	24.5	27	40	1	120	15	0.3	1	24.5	0.005	500	1.3
VJ20MA0160K--	1206	14	16	22	24.5	27	40	1	200	15	0.6	1.5	24.5	0.008	800	1.7
VJ20PA0160K--	1206	14	16	22	24.5	27	40	1	300	15	1.1	2	24.5	0.008	1 100	1.7
VJ13MA0160K--	1210	14	16	22	24.5	27	40	2.5	400	15	1.6	3	24.5	0.010	1 800	1.7
VJ13PA0160K--	1210	14	16	22	24.5	27	40	2.5	500	15	2	5	24.5	0.010	2 300	1.7
VJ14MA0160K--	1812	14	16	22	24.5	27	40	5	800	15	2.4	6	25.5	0.015	5 400	2.0
VJ14PA0160K--	1812	14	16	22	24.5	27	40	5	1000	15	2.9	10	25.5	0.015	6 200	2.0
VJ15MA0160K--	2220	14	16	22	24.5	27	40	10	1200	15	5.8	12	25.5	0.030	11 000	2.0
VJ15PA0160K--	2220	14	16	22	24.5	27	40	10	1500	15	7.2	25	25.5	0.030	16 000	2.0
VJ15QA0160K--	2220	14	16	22	24.5	27	40	10	1800	15	7.5	35	25.5	0.030	25 000	2.0
VJ32PA0160K--	3220	14	16	22	24.5	27	40	10	2000	15	13.8	50	24.5	0.040	30 000	2.5
<b>12-22 V Power Supply</b>																
VJ20PA0220K--	1206	17	22	27	30	33	49	1	250	15	1	2	26	0.008	1 000	1.7
VJ13PA0220K--	1210	17	22	27	30	33	49	2.5	400	15	1.7	5	26	0.010	2 000	1.7
VJ14PA0220K--	1812	17	22	27	30	33	49	5	700	15	2.5	10	26	0.015	6 000	2.0
VJ15PA0220K--	2220	17	22	27	30	33	49	10	1200	15	6.8	25	26	0.030	15 000	2.0
VJ32PA0220K--	3220	17	22	27	30	33	49	10	2000	15	13	50	26	0.040	25 000	2.5
<b>12-26 V Power Supply</b>																
VJ20PA0260K--	1206	23	26	31.5	35	38.5	57	1	200	15	1	2	30	0.008	600	1.7
VJ13PA0260K--	1210	23	26	31.5	35	38.5	57	2.5	300	15	1.7	5	30	0.010	1 200	1.7
VJ14PA0260K--	1812	23	26	31.5	35	38.5	57	5	600	15	2.5	10	30	0.015	3 000	2.0
VJ15PA0260K--	2220	23	26	31.5	35	38.5	57	10	1200	15	6.8	25	30	0.030	7 000	2.0
VJ32PA0260K--	3220	23	26	31.5	35	38.5	57	10	1800	15	13	50	30	0.040	15 000	2.5
<b>24-34 V Power Supply</b>																
VJ20PA0340K--	1206	30	34	42.3	47	51.7	77	1	200	15	1.5	1.5	47	0.008	300	1.7
VJ13PA0340K--	1210	30	34	42.3	47	51.7	77	2.5	350	15	3.5	3	47	0.010	650	1.7
VJ14PA0340K--	1812	30	34	42.3	47	51.7	77	5	600	15	5	6	47	0.015	1 800	2.0
VJ15MA0340K--	2220	30	34	42.3	47	51.7	77	10	1200	15	10	12	47	0.030	4 000	2.0
VJ15PA0340K--	2220	30	34	42.3	47	51.7	77	10	1200	15	12	25	47	0.030	7 000	2.0
VJ32PA0340K--	3220	30	34	42.3	47	51.7	77	10	2000	15	13	50	47	0.040	10 000	2.5
<b>24-42 V Power Supply</b>																
*VJ20PA0420K--	1206	37	42	50.4	56	61.6	91	1	150	15	1.5	1.5	47	0.008	140	1.7
*VJ13PA0420K--	1210	37	42	50.4	56	61.6	91	2.5	250	15	3.5	3	47	0.010	300	1.7
*VJ14PA0420K--	1812	37	42	50.4	56	61.6	91	5	500	15	5	6	47	0.015	800	2.0
*VJ15PA0420K--	2220	37	42	50.4	56	61.6	91	10	900	15	12	12	47	0.030	1 800	2.0
*VJ32PA0420K--	3220	37	42	50.4	56	61.6	91	10	1300	15	13	50	47	0.040	2 800	2.5

\* under development

\*\* time interval between pulses: 60s min.

VC with hybrid solderable termination same electrical characteristics

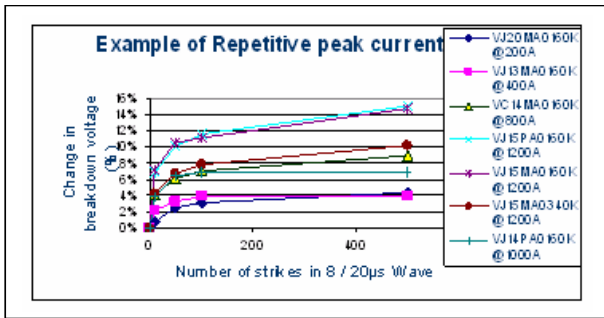
Other voltage or energy values available upon request



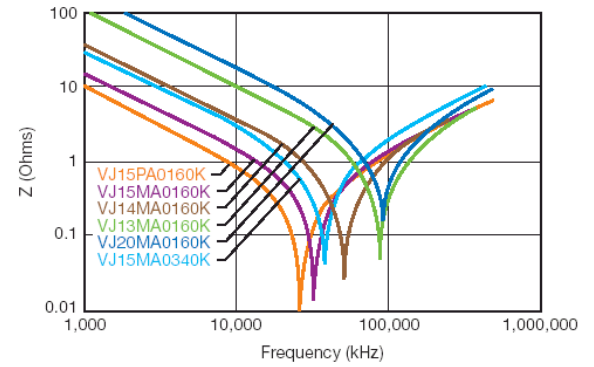
# Glass Encapsulated SMD Varistor MLV (VJ12, 20, 13, 14, 15, 32) Automotive MLV Range MA-PA-QA Series



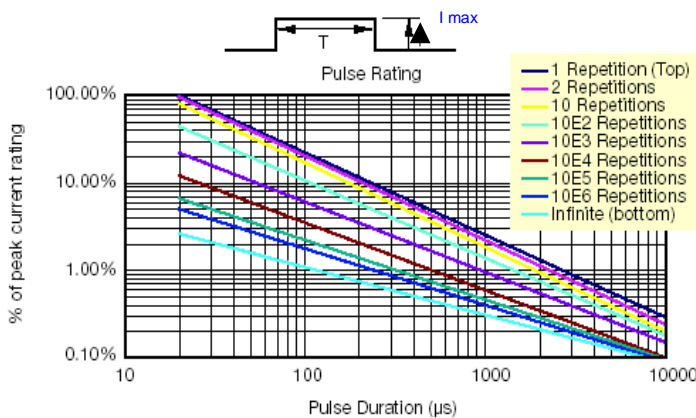
## Pulse degradation versus strikes (8x20μs)



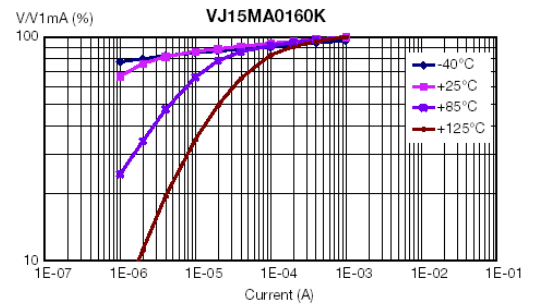
## IMPEDANCE CHARACTERISTICS



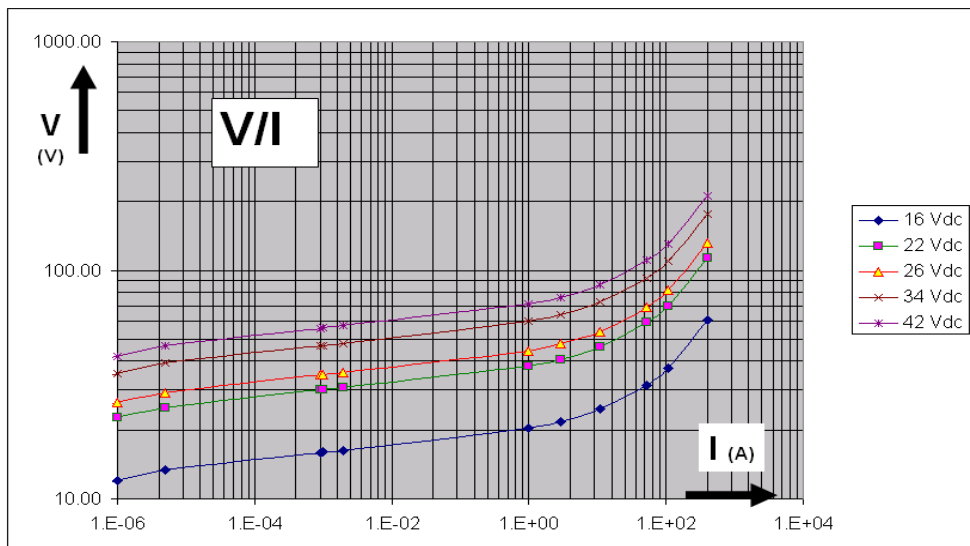
## PULSE RATING



## EXAMPLE OF TEMPERATURE DEPENDANCE OF I/V



## V / I Characteristics:

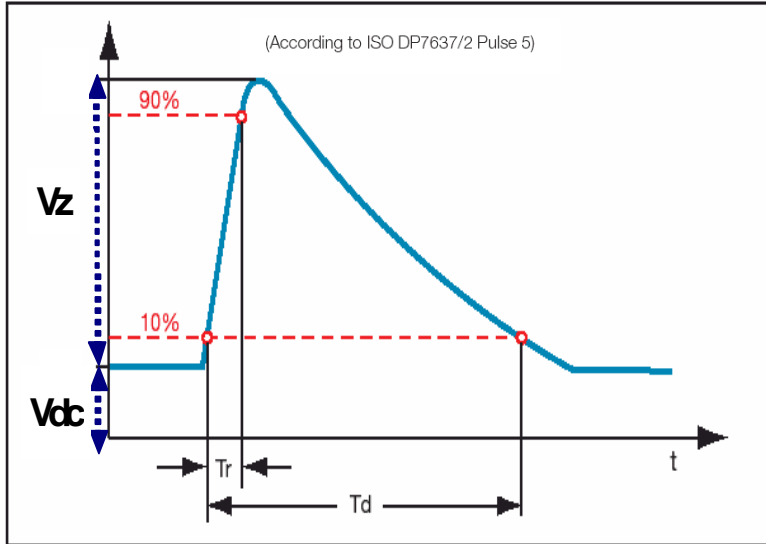


RoHS/ELV

# Glass Encapsulated SMD Varistor MLV (VJ12, 20, 13, 14, 15, 32) Automotive MLV Range MA-PA-QA Series



## Load Dump Data



When using the test method indicated by the unsuppressed load dump pulse 5, the amount of energy absorbed by the varistor (form of heating) does not exceed the Load Dump Energy value specified in the product table.

Time interval between pulses: 60s min.

Vz = pulse generator voltage  
Vdc = battery voltage

Parameter	12V system	24V system
Vz	65V to 87V	123V to 174V
Ri (internal resistance)	0.5Ω to 4Ω	1Ω to 4Ω
Td	40ms to 400ms	100ms to 350ms
Tr	10 +0, -5ms	

## Load dump Library Pulse 5: Typical max. Vz versus Pulse duration and Ri

VJ20PA0160K	0.5 Ω	1 Ω	2 Ω	4 Ω
50ms	33	34	39	49
100ms	31	31	34	43
200ms	27	28	34	43
400ms	28	30	33	42
VJ13PA0160K	0.5 Ω	1 Ω	2 Ω	4 Ω
50ms	44	48	57	75
100ms	36	39	46	60
200ms	33	33	39	50
400ms	28	28	34	46
VJ14PA0160K	0.5 Ω	1 Ω	2 Ω	4 Ω
50ms	60	68	85	125
100ms	46	52	62	77
200ms	37	41	50	63
400ms	32	35	43	54
VJ15PA0160K	0.5 Ω	1 Ω	2 Ω	4 Ω
50ms	80	116	145	188
100ms	61	80	104	140
200ms	47	60	78	100
400ms	39	47	58	74

VJ15QA0160K	0.5 Ω	1 Ω	2 Ω	4 Ω
100ms	65	78	91	117
200ms	54	60	73	92
400ms	44	51	60	75
VJ15MA0340K	0.5 Ω	1 Ω	2 Ω	4 Ω
100ms	66	78	91	117
200ms	55	60	73	92
400ms	49	53	60	75
VJ15PA0340K	0.5 Ω	1 Ω	2 Ω	4 Ω
100ms	80	90	108	134
200ms	60	67	80	106
400ms	58	62	69	85
VJ32PA0160K	0.5 Ω	1 Ω	2 Ω	4 Ω
100ms	90	116	149	200
200ms	62	75	98	140
400ms	47	58	72	95
VJ32PA0340K	0.5 Ω	1 Ω	2 Ω	4 Ω
100ms	90	105	133	170
200ms	70	79	98	132
400ms	62	70	83	106

# Glass Encapsulated SMD Varistor MLV (VJ12, 20,13,14,15, 32) Industrial MLV Range M0 Series



## FEATURES

Device available in case sizes 1206, 1210, 1812, 2220, 3220  
Voltage Ratings from 14Vrms to 300Vrms  
Response time < 1ns  
VJ with Nickel Barrier termination suitable for lead-free soldering  
VC with hybrid solderable termination  
Operating temperature from -55°C to +125°C (max 85° C for VC & VJ32 series from 115Vrms to 300Vrms)  
Storage temperature from -55 to +150°C (MSL1)  
RoHS Compliant  
UL Approval pending in 3220 for voltage from 115 to 300Vrms

## APPLICATIONS

MOV (Radial ) replacement  
Over-voltage protection and transient suppression  
Electric meters  
Industrial equipment  
Hybrid automotive protection  
Telecommunications  
Consumer Electronics  
Plug-in cards, remote controls  
Home automation  
Medical

## PART NUMBERS

### VJ20 to VJ15 Case Sizes

Part Number	Case Size	Operating voltage		Breakdown Voltage Voltage at 1mA			Max. Clamping Voltage 8*20µs		Max. Leakage current µA	Energy 10*1000µs Joule	Max. peak current 8*20µs 1 pulse A	Cap. Typical (1KHz,05V) pF
		Vrms	Vdc	min.	average	max.	V	A				
VJ20M00140K--	1206	14	18	19.8	22	24.2	38	1.0	15	0.5	200	800
VJ13M00140K--	1210	14	18	19.8	22	24.2	38	2.5	15	1.5	400	1800
VJ14M00140K--	1812	14	18	19.8	22	24.2	38	5.0	15	2.3	800	4200
VJ15M00140K--	2220	14	18	19.8	22	24.2	38	10.0	15	5.8	1200	9600
VJ20M00170K--	1206	17	22	24.3	27	29.7	44	1.0	15	0.6	200	800
VJ13M00170K--	1210	17	22	24.3	27	29.7	44	2.5	15	1.7	400	1600
VJ14M00170K--	1812	17	22	24.3	27	29.7	44	5.0	15	2.7	800	3700
VJ15M00170K--	2220	17	22	24.3	27	29.7	44	10.0	15	7.2	1200	8600
VJ20M00200K--	1206	20	26	24.7	33	36.3	54	1.0	15	0.7	200	600
VJ13M00200K--	1210	20	26	24.7	33	36.3	54	2.5	15	1.9	400	1200
VJ14M00200K--	1812	20	26	24.7	33	36.3	54	5.0	15	3.0	800	3000
VJ15M00200K--	2220	20	26	24.7	33	36.3	54	10.0	15	7.8	1200	6400
VJ20M00250K--	1206	25	31	35.1	39	42.9	65	1.0	15	1.0	200	400
VJ13M00250K--	1210	25	31	35.1	39	42.9	65	2.5	15	1.7	300	1100
VJ14M00250K--	1812	25	31	35.1	39	42.9	65	5.0	15	3.7	800	2400
VJ15M00250K--	2220	25	31	35.1	39	42.9	65	10.0	15	9.6	1200	5500
VJ20M00300K--	1206	30	38	42.3	47	51.7	77	1.0	15	1.1	200	350
VJ13M00300K--	1210	30	38	42.3	47	51.7	77	2.5	15	2.0	300	750
VJ14M00300K--	1812	30	38	42.3	47	51.7	77	5.0	15	4.2	800	1900
VJ15M00300K--	2220	30	38	42.3	47	51.7	77	10.0	15	12.0	1200	4200
VJ20M00350K--	1206	35	45	50.4	56	61.6	90	1.0	15	0.6	200	260
VJ13M00350K--	1210	35	45	50.4	56	61.6	90	2.5	15	2.0	300	530
VJ14M00350K--	1812	35	45	50.4	56	61.6	90	5.0	15	4.0	500	1400
VJ15M00350K--	2220	35	45	50.4	56	61.6	90	10.0	15	7.7	1000	2800
VJ20M00400K--	1206	40	56	61.2	68	74.8	110	1.0	15	0.7	200	180
VJ13M00400K--	1210	40	56	61.2	68	74.8	110	2.5	15	2.3	250	380
VJ14M00400K--	1812	40	56	61.2	68	74.8	110	5.0	15	4.8	500	800
VJ15M00400K--	2220	40	56	61.2	68	74.8	110	10.0	15	9.0	1000	2000
VJ20M00500K--	1206	50	65	73.8	82	90.2	135	1.0	15	0.8	200	160
VJ13M00500K--	1210	50	65	73.8	82	90.2	135	2.5	15	1.6	200	300
VJ14M00500K--	1812	50	65	73.8	82	90.2	135	5.0	15	4.5	400	800
VJ15M00500K--	2220	50	65	73.8	82	90.2	135	10.0	15	5.6	800	1400
VJ20M00600K--	1206	60	85	90.0	100	110	165	1.0	15	0.9	120	100
VJ13M00600K--	1210	60	85	90.0	100	110	165	2.5	15	2.0	200	210
VJ14M00600K--	1812	60	85	90.0	100	110	165	5.0	15	5.8	400	600
VJ15M00600K--	2220	60	85	90.0	100	110	165	10.0	15	6.8	800	1100

VC with solderable hybrid termination same electrical characteristics

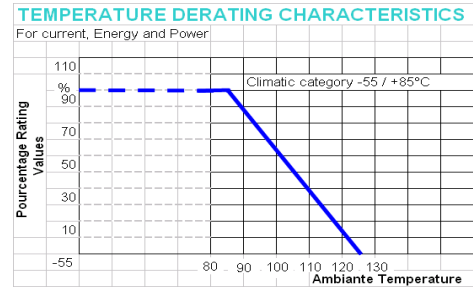
# Glass Encapsulated SMD Varistor MLV

(VJ12, 20,13,14,15, 32)

Industrial MLV Range M0 Series



## VJ32 Case Size including high voltages



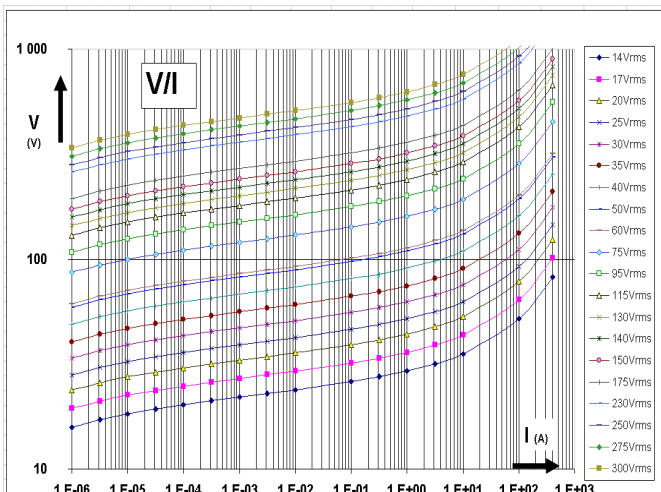
## PART NUMBERS

Climatic Category -55°C / + 85°C

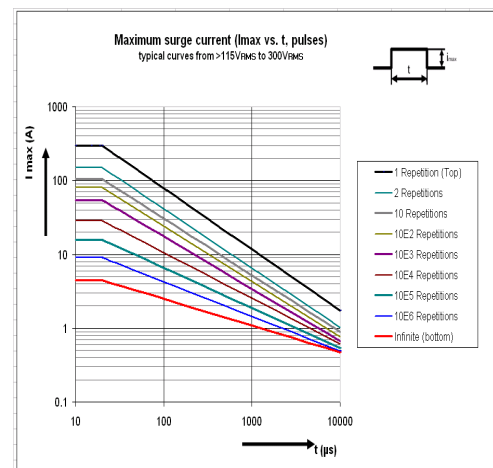
	Case Size	Operating voltage		Breakdown Voltage			Max. Clamping Voltage 8*20µs		Max. Leakage current	Energy 10*1000µs Joule	Max. peak current 8*20µs 1 pulse A	Cap. Typical (1KHz,05V) PF
				Voltage at 1mA								
				min.	average	max.						
		Vrms	Vdc				V	A	µA			
VJ32M00140K--	3220	14	18	19.8	22	24.2	47	10	15	0.7	1500	15000
VJ32M00170K--	3220	17	22	24.3	27	29.7	57	10	15	0.9	1500	15000
VJ32M00200K--	3220	20	26	29.7	33	36.3	68	10	15	1.1	1500	15000
VJ32M00250K--	3220	25	31	35.1	39	42.9	79	10	15	1.2	1500	15000
VJ32M00300K--	3220	30	38	42.3	47	51.7	92	10	15	1.5	1500	15000
VJ32M00350K--	3220	35	45	50.4	56	61.6	107	10	15	1.8	1200	10000
VJ32M00400K--	3220	40	56	61.2	68	74.8	127	10	15	2.2	1200	10000
VJ32M00500K--	3220	50	66	73.8	82	90.2	135	10	15	2.5	1000	5000
VJ32M00600K--	3220	60	85	90.0	100	110	165	10	15	3	1000	5000
VJ32M00750K--	3220	75	102	108	120	132	200	10	15	3.5	600	2000
VJ32M00900K--	3220	95	127	135	150	165	250	10	15	6	600	1500
VJ32M01150K--	3220	115	153	162	180	198	295	10	15	6.5	300	350
VJ32M00131K--	3220	130	175	180	200	220	340	10	15	7	300	170
VJ32M00141K--	3220	140	180	198	220	242	360	10	15	7.5	300	140
VJ32M00151K--	3220	150	200	216	240	264	395	10	15	9	300	130
VJ32M01750K--	3220	175	225	243	270	297	455	10	15	9.5	300	120
VJ32M00231K--	3220	230	300	324	360	396	595	10	15	10	300	80
VJ32M00251K--	3220	250	330	351	390	429	650	10	15	11	300	75
VJ32M02750K--	3220	275	369	387	430	473	710	10	15	13	300	70
VJ32M00301K--	3220	300	385	423	470	517	775	10	15	15	300	65

VC32 Series with solderable hybrid termination. Glass encapsulation from 115Vrms to 300Vrms.  
Other voltage values available upon request

## V / I Characteristics



## Surge Current Ratings



# Glass Encapsulated SMD Varistor MLV (VJ14)

## Telecom MLV Range MT Series



### FEATURES

Effective alternative to leaded MOVs between 60 and 90V<sub>RMS</sub>  
 High Energy Ratings up to 6 Joules with 1812 case size  
 VJ Nickel barrier or VC hybrid solderable termination  
 Multiple Strike Capability  
 Provide EMC Capacitance  
 Specified in accordance to CCITT 10/1000µs pulse test  
 RoHS Compliant and IMDS Registration upon request

### CCITT 10 x 1000µs TEST

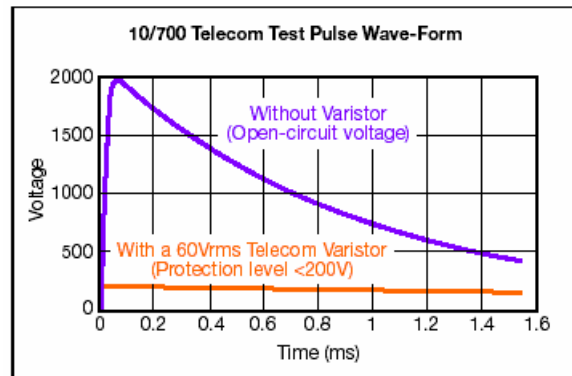
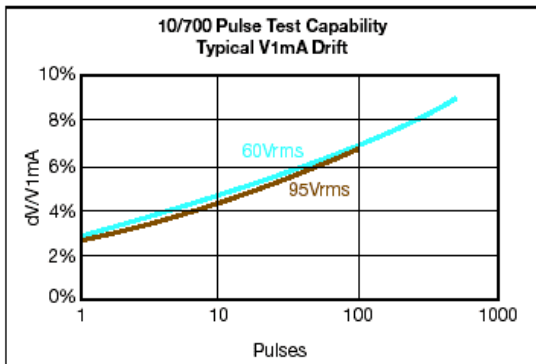
A pulse of 10 x 700µs durations specified by CCITT or IEC 61000-4-5 is often used to check the interference immunity of Telecom equipment.  
 The curves show that the 60Vrms Varistor can reduce the interference of the equipment from 2KV to less than 200V.

### TARGET APPLICATION

Phone Lines, ADSL and other Telecom Circuits

### GENERAL CHARACTERISTICS

Storage temperature: -40°C to +125°C  
 Operating temperature: -40°C to +85°C



Ten pulses with a duration of 10x700µs applied at one

### PART NUMBERS

Part Number	Case Size	Operating Voltage		Breakdown Voltage V <sub>1mA</sub>	Max. clamping voltage		CCITT 10 pulses 10*700µs Amp.	I max. 8*20µs Amp.	Energy 10*1000µs Joules	Mean Power Dissipation W	Typical capacitance pF
		Vac	Vdc		V	Amp.					
VJ14MT0600K--	1812	60	85	107	200	45	45	400	6	0.015	400
VJ14MT0750K--	1812	75	100	120	250	45	45	400	6	0.015	400
VJ14MT0950K--	1812	95	125	150	270	45	45	250	5	0.015	280

VC with hybrid solderable termination same electrical characteristics

Other voltage values available upon request



RoHS/ELV



# Glass Encapsulated SMD Varistor MLV VJ13 Standard Range MC-PC Series



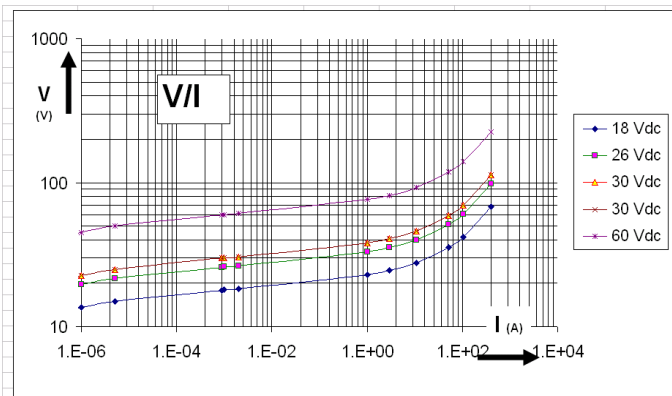
## FEATURES

- Lead less surface mount chip 1210 Case Size
- Voltage Ratings from 18Vdc to 60Vdc
- Response time < 1ns
- Nickel Barrier and Tin plated termination suitable for lead-free soldering
- Operating temperature from -55°C to +125°C
- Storage temperature from -55 to +150°C (MSL1)
- RoHS Compliant

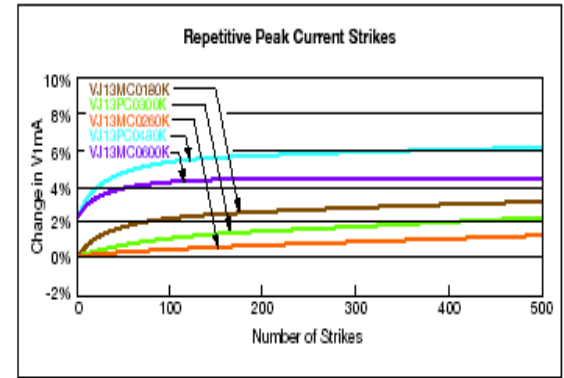
## APPLICATIONS

- Protection of various semiconductor elements from over-voltage
- Industrial equipment
- Consumer Electronics
- Plug-in cards, remote controls
- Home automation

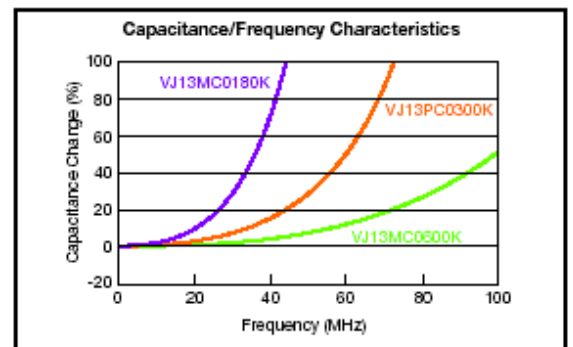
## V / I Characteristics



## PULSE DEGRADATION



## CAP VS FREQ CHARACTERISTICS



## PART NUMBERS

Part Number	Working Voltage	Breakdown Voltage Voltage at 1mA			Vclamp (8x20µs)		max. peak current (8x20µs)	Energy (10x1000µs)	CAP (1KHz/.5Vrms)
		min	Nom	max	Vp	Ip(A)			
VJ13MC0180K--	18	21.6	24	26.5	45	10	500	1.5	2200
VJ13MC0260K--	26	29.7	33	36.3	62	10	300	1.2	1200
VJ13MC0300K--	30	35.1	39	42.9	73	10	220	0.9	1000
VJ13PC0300K--	30	35.1	39	42.9	73	10	280	1.2	1000
VJ13MC0480K--	48	54.5	60.5	66.5	110	10	220	0.9	800
VJ13PC0480K--	48	54.5	60.5	66.5	110	10	250	1.2	500
VJ13MC0600K--	60	67	75	83	126	10	250	1.5	400

VC with hybrid solderable termination same electrical characteristics  
Other voltage values available upon request

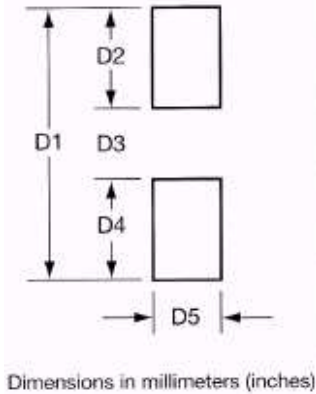


RoHS/ELV

# Glass Encapsulated SMD Varistor MLV (VJ12, 20, 13, 14, 15, 32)



## Recommended solder pad layout



### Reflow

Case Size	D1	D2	D3	D4	D5
1206	4.00 (0.16)	1.00 (0.04)	2.00 (0.09)	1.00 (0.04)	1.06 (0.06)
1210	4.00 (0.16)	1.00 (0.04)	2.00 (0.09)	1.00 (0.04)	2.05 (0.10)
1812	5.60 (0.22)	1.00 (0.04)	3.60 (0.14)	1.00 (0.04)	3.00 (0.12)
2220	6.60 (0.26)	1.00 (0.04)	4.60 (0.18)	1.00 (0.04)	5.00 (0.20)
3220	10.21 (0.40)	2.21 (0.09)	5.79 (0.23)	2.21 (0.09)	5.50 (0.22)

### Wave

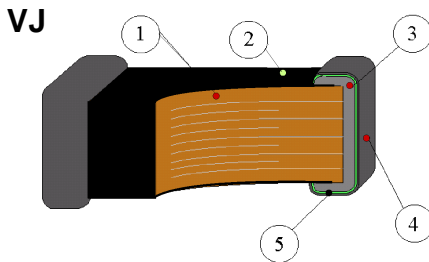
Case Size	D1	D2	D3	D4	D5
1206	5.00 (0.19)	1.50 (0.06)	2.00 (0.09)	1.50 (0.06)	1.06 (0.06)
1210	5.00 (0.19)	1.50 (0.06)	2.00 (0.09)	1.50 (0.06)	2.05 (0.10)
1812	6.60 (0.26)	1.50 (0.06)	3.60 (0.14)	1.50 (0.06)	3.00 (0.12)
2220	7.60 (0.29)	1.50 (0.06)	4.60 (0.18)	1.50 (0.06)	5.00 (0.20)
3220	11.21 (0.44)	1.50 (0.06)	5.79 (0.23)	1.50 (0.06)	5.50 (0.22)

## Soldering recommendations

### VJ Series: nickel barrier termination

The nickel barrier layer of the silver with plated nickel/tin termination prevents leaching of the silver base metallization layer. This increases wettability and flexibility in the selection of soldering parameters.

**The glass encapsulation increases the acid-resistance against harsh environment including chlorite soldering flux.**

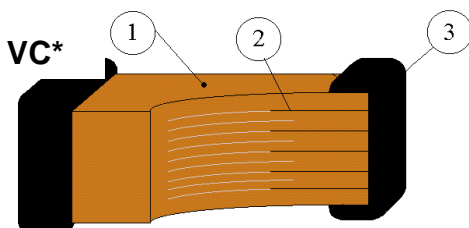


1	Zinc varistor with inner AgPd electrodes
2	Glass lead-free encapsulation
3	Silver termination
4	Plated nickel barrier
5	Plated tin 100%

### VC Series: hybrid solderable termination

Hybrid solderable terminations are used for chips intended for conductive adhesion (gluing process). Silver-palladium-platinum reduces susceptibility to corrosion.

The silver or silver-palladium-platinum are not approved for lead-free soldering. In this case we recommended solders 62/36/2 (Sn/Pb/Ag), 60/40 (SnPb), or 63/37 (Sn/Pb) with RMA solder flux.



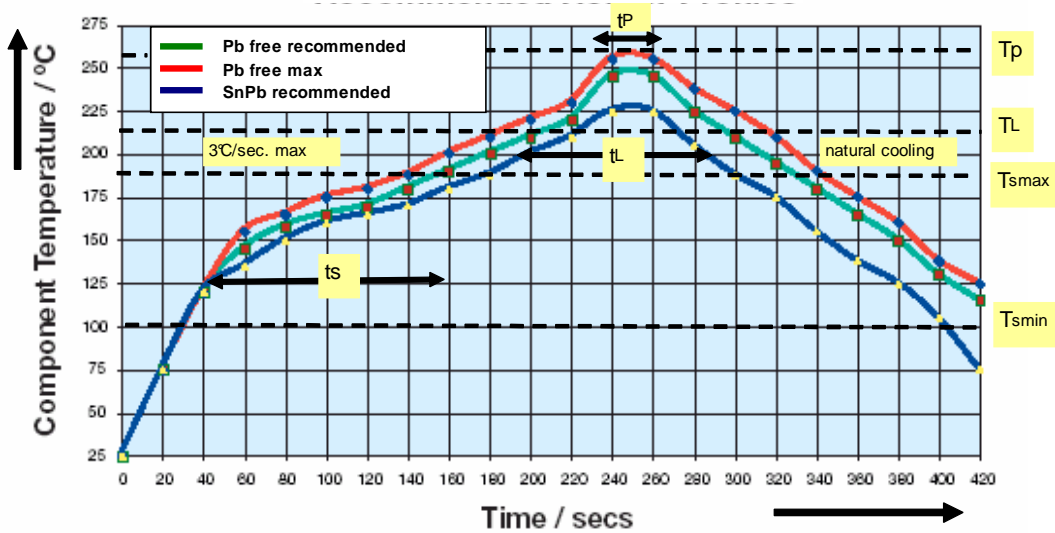
1	Zinc varistor
2	Inner AgPd electrodes
3	Hybrid solderable termination

\* VC Series without glass encapsulation except VC32M0 Series from 115Vrms to 300Vrms

# Glass Encapsulated SMD Varistor MLV (VJ12, 20, 13, 14, 15, 32)

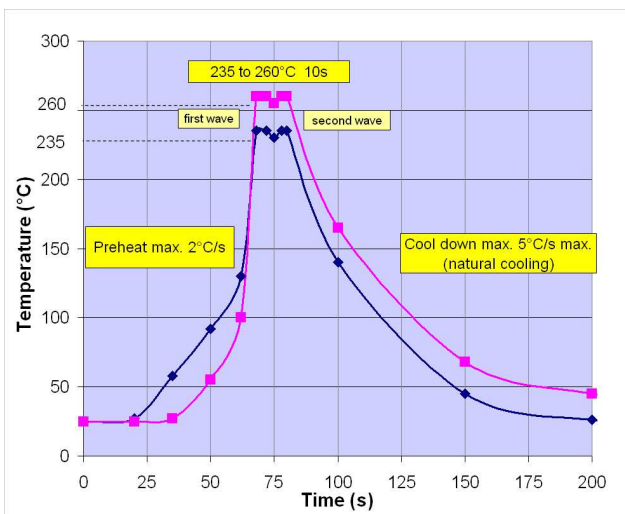


## Reflow soldering temperature profiles recommendations according to J-STD-020D for VJ and VC Series



Reflow soldering profile		Sn-Pb solder	Pb-free solder
Preheat and soak			
-Temperature min	Ts min	100°C	150°C
-Temperature max	Ts max	150°C	200°C
-Time	ts	60 to 120 sec	60 to 180 sec
Average ramp-up rate		3°C/sec max	3°C/sec max
Liquidus temperature	TL	183°C	217°C
Time at liquidus	tL	60 to 150 sec	60 to 150 sec
Peak temperature (+0/-5°C)	Tp	220 to 235°C	245 to 260°C
Peak time	tP	20 sec	30 sec
Average ramp-down rate		natural cooling	natural cooling
Time 25°C to peak temperature		maximum 6 mn	maximum 8 mn

## Wave soldering temperature profile recommendations for VJ and VC Series



The component should be soldered within 2 years delivery from AVX-TPC.  
The usage of mild, non activated fluxes for soldering is recommended, as well as a proper cleaning of the PCB.

# Glass Encapsulated SMD Varistor MLV

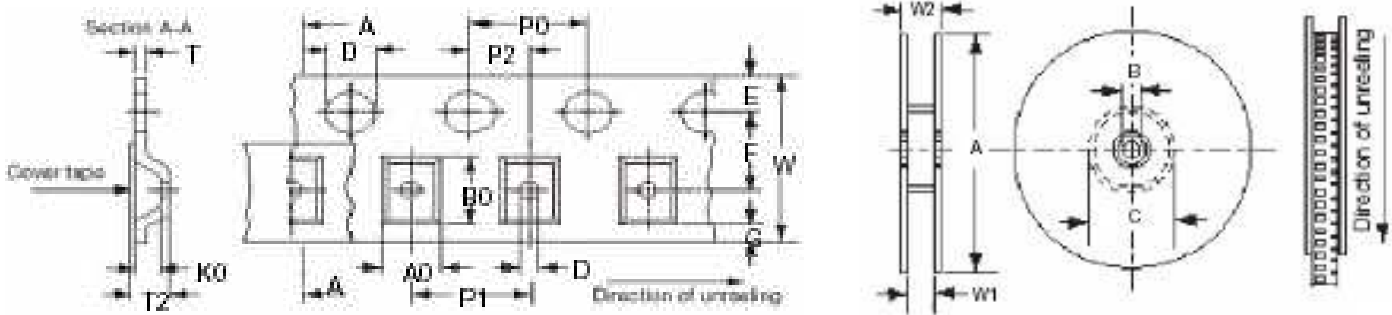


## TAPING CHARACTERISTICS

In accordance with IEC publication 286-3

Dimensions in mm (inch)

Ordering code	Tape dimensions			Reel dimensions				Packaging Unit	
	W	P1	K0	W	A	W1	W2 max	Bulk	Reel
unit	mm	mm	mm	inch	mm	mm	mm		
VC-VJ12	8.0	4 ± 0.10	1.8 max	7	178 max.	8.4 +1.5/0.0	14.4 max	Upon request	4000
VC-VJ20	8.0	4 ± 0.10	1.9 max	7	178 max.	8.4 +1.5/0.0	14.4 max		3000
VC-VJ13	8.0	4 ± 0.10	1.9 max	7	178 max.	8.4 +1.5/0.0	14.4 max		2000
VC-VJ14	12.0	8 ± 0.10	1.9 max	7	178 max.	13.0 ± 0.25	14.4 max		1250
VC-VJ15 MA/PA/M0	12.0	8 ± 0.10	2.5 max	7	178 max.	13.0 ± 0.25	14.4 max		1250
VC-VJ15 QA	12.0	8 ± 0.10	2.5 max	7	178 max.	13.0 ± 0.25	14.4 max		1000
VC-VJ32	16.0	8 ± 0.10	2.5 max	13	330 (+0/-2)	16.4 +1.5/0.0	22.4 max.		1000



## IDENTIFICATION AND TRACEABILITY

On the packaging of all shipped varistors, you will find a bar code label.

This label gives systematic information on the type of product, part number, manufacturing date and quantity. An example is given below:

Manufacturing date

↓(YYMMDD)

Lot number



(H) Lot : 1A9B02560101 /006 10/09/22

RoHS COMPLIANT



← RoHS Logo

Quantity of parts per packaging



(Q) Qty : 1250

Part number reference



(2W) TPC-PN : VJ15MA0160KBA

MADE IN FRANCE  
AVX™

This information allows complete traceability of the entire manufacturing process. This is useful for any information request, customer complaint or product returns.

